

XXII.—*On Deep-water Hydroids from Iceland.*
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[Plates VI., VII., & VIII.]

SOME years have elapsed since Mr. Busk placed in my hands a bottle containing some northern Hydroids and Polyzoa which had been obtained by Dr. Wallich. The contents have been long since partially examined, and some of the results have been already published; but no separate report upon them has appeared, and some new forms which they have yielded are still undescribed. I propose therefore in the present paper to deal with the Hydroid portion. The gathering, though a very small one, is characteristic and interesting. It was taken up from a depth of 100 fathoms off Reikiavik, Iceland, "amongst icebergs, grounded and drifting." The number of species observed is only seventeen; and of these a large proportion belong to the Campanularian group of the Lafoëidæ. The extreme north seems to be in a special manner the home of the minute forms composing this family. No less than twelve species have been obtained off the coast of Norway by Dr. M. Sars and his son G. Ossian Sars, whose name is so honourably connected with the early history of deep-sea dredging. To these must be added four more, which I have found amongst the Icelandic dredgings, raising the whole number of Lafoëidæ known to inhabit the northern seas to sixteen. The British species number eleven.

These Hydroids are mostly inhabitants of deep water; off the coasts of Norway many of them occur at depths of from 50 to 100 fathoms, others at depths of 150, 200, and 300 fathoms respectively. The Icelandic specimens, as I have mentioned, were taken up in 100 fathoms*. A few of the Norwegian species occur in shallower water, ranging from 20 to 50 fathoms; but they constitute a very small proportion of the whole number. Some have a wide bathymetrical range: thus *Lafoëa dumosa* occurs in the littoral or Laminarian region, and has been dredged in 145 fathoms; and *L. gracillima*, which I have obtained in great luxuriance at Oban in 15–20 fathoms, has occurred to G. O. Sars off the island of Hvitingstö in 150. *Filellum serpens*, the common parasite of some of the larger Sertularians in the "Coralline zone," ranges, according

* During the 'Porcupine' expedition a *Lafoëa* was dredged up from a depth of 345 fathoms. It was obtained from the "cold area" between Shetland and the Faroe Islands, at a point where the temperature of the water varied from 30°·5 Fahr. to 29°·8 Fahr. (*vide* Allman's 'Tubularian Hydroids,' part ii. p. 165).

to the same excellent observer, to the great depth of 300 fathoms. On the whole, the Lafoëidæ may be regarded as a deep-water group, and as most richly developed in the northern seas, so far as our present knowledge goes.

In the Icelandic dredgings they occur in profusion, and most of them attain a remarkable size. In the present paper I shall describe a new species (*Lafoëa grandis*) which is a veritable giant amongst its pigmy kindred, its calyces being nearly three times as large as those of the well-known *L. dumosa*. The representatives of *Calycella syringa* are about twice as large as those which may be met with on our own coasts. *Calycella pygmæa* * as found amongst the icebergs has almost ceased to deserve its name. I may also mention that Labrador specimens of *Lafoëa pocillum* are about twice the size of others obtained at Oban. And the larger growth is not confined to the Lafoëidæ; a gigantic variety of *Sertularella polyzonias* is also present, the calyces of which are very nearly three times as ample as those of the normal form, while the whole habit is singularly robust. *Sertularella tricuspidata*, a distinctly northern form and the principal element of the Icelandic dredgings, exhibits the greatest luxuriance and beauty, and bears in amazing profusion the reproductive capsules, which frequently line the branches throughout their whole extent.

What may be the cause of this unusual development I cannot pretend, with my present information, to decide; but the fact is undoubted.

The following is a list of the species:—

Subkingdom CŒLEENTERATA.

Class HYDROZOA.

Order HYDROÏDA.

Suborder THECAPHORA.

Family Campanulariidæ.

Campanularia volubilis, Linn.

Abundant on *Sertularia* &c. With capsules.

* In my 'History of the British Hydroid Zoophytes' I have ranked this species doubtfully amongst the unoperculated forms which constitute the genus *Lafoëa*. But I have ascertained that it is in fact provided with an operculum; and it must therefore be transferred to the genus *Calycella*.

Family **Lafoëidæ.**

Lafoëa grandis, n. sp. Pl. VI. figs. 1, 2.

Lafoëa fruticosa, G. O. Sars, Bidr. till Kundskaben om Norges Hydroider, p. 26, pl. iv. figs. 16-18.

Stem erect, compound, much and irregularly branched. *Hydrothecæ* large, campanulate, with a plain circular margin, borne on ringed pedicels (about three rings), and somewhat spirally disposed. *Gonothecæ* unknown.

The calyces of this handsome species are distinguished from those of all the other members of the genus by their size and campanulate form. As I have already mentioned, they are about three times as large as those of *L. dumosa*, and are raised on a well-developed pedicel with three or four strongly marked annulations. Instead of being tubular, they are of a tall bell-shaped figure, expanding slightly towards the orifice. They occur in pairs, which spring alternately from different aspects of the stem, and assume therefore a somewhat spiral arrangement.

Though very abundant, *L. grandis* only occurs in fragments amongst the Icelandic dredgings; but Sars's figure* shows that it attains a luxuriant shrubby growth, rising to a height of about an inch and a half.

Lafoëa fruticosa, M. Sars. Pl. VI. figs. 6-10, and Pl. VII. fig. 16.

Campanularia gracillima, Alder.

I have given my reasons elsewhere for identifying the *L. fruticosa* of Sars with Alder's *C. gracillima*, notwithstanding the opposite decision of G. O. Sars †. In one of the plates which accompany this paper I have given figures, carefully drawn with the *camera lucida*, of the Norwegian and the British forms for comparison. Both the variety with a *twisted* pedicle, described by Alder as *C. gracillima*, and the normal *L. fruticosa* occur amongst the Icelandic dredgings.

Calycella syringa, Linn.

Abundant on other zoophytes.

The calyces about double the size they attain in British examples. The gonothecæ are borne plentifully on the Icelandic specimens, and on others which I have received from Labrador. They are comparatively rare on our coasts.

Lofoten, from 60-80 fathoms, and more commonly from

* Bidrag till Kundskaben om Norges Hydroider, pl. iv. fig. 16.

† Vide a paper on new Norwegian Hydroida from deep water in the present Number of the 'Annals' (*suprà*, p. 132).

20–30 fathoms. “On the stems of *Eudendrium capillare*, Alder, which is often almost covered with its little transparent calyces and reproductive capsules, as with a fine down” (G. O. Sars).

Calycella pygmaea, Alder. Pl. VII. fig. 15.

On other Hydroids.

Calycella obliqua, n. sp. Pl. VI. figs. 4, 5.

Stem erect, simple, rooted by a filiform stolon. *Hydrothecæ* alternate, elongate, tubular (height more than four times as great as the breadth), gracefully curved, the convex side uppermost, obliquely truncate above, furnished with an internal membranous operculum, and borne on short ringed pedicels. *Gonothecæ* unknown.

This very distinct and elegant form is at once distinguishable from all its kindred by its obliquely truncate hydrothecæ. The wall of the calycele on one side for a short distance below the margin seems to be simply membranous, and to fold inwards slantwise across the tube, so as to form a kind of internal operculum.

Several specimens have occurred growing on other zoo-phytes.

Calycella quadridentata, n. sp. Pl. VIII. figs. 17–20.

Hydrothecæ cylindrical, usually slightly incurved on one side, the height about three times as great as the breadth, with a quadridentate margin and an operculum composed of four pieces, borne on ringed pedicels of variable length (3–7 rings), which rise at intervals from a creeping stem. *Gonothecæ* unknown.

This species, which bears a general resemblance to *C. syringa*, is at once known by the quadridentate rim of the calyces and the quadripartite operculum. The denticles on the margin are well marked; and the operculum is composed of four broad and short segments, corresponding with the spaces between them; whereas in *C. syringa* it is made up of as many as eight or nine rather narrow and elongate pieces, forming a somewhat elevated cone (Pl. VIII. fig. 24). The calyces are of the same general shape in the two species; but the outline is stiffer and less wavy in *C. syringa* than in the present form. The pedicel of *C. quadridentata* is rather thicker than that of its ally, and is usually, as far as I have observed, short (3 or 4 rings), though sometimes the number rises as high as seven.

This elegant form is not uncommon amongst the Icelandic dredgings, creeping over other Hydroids.

Cuspidella humilis, Hincks.

Creeping over the stems of *Halecium crenulatum*.

Lafoëina tenuis, M. Sars.

This remarkable Hydroid, first described by the elder Sars, and figured by his son in his recent paper on Norwegian Hydroida, occurs amongst the Icelandic dredgings, creeping over other zoophytes. The species may readily be mistaken for the *Cuspidella humilis* (mihi), from which it is chiefly distinguished by the very remarkable sarcothecæ with which it is furnished. In preserved specimens these may be easily overlooked.

Filellum serpens, Hassall.

Creeping over the stem of other zoophytes. It has a wide distribution on the Norwegian coasts, and occurs at great depths as well as in shallower water.

Lofoten, from 300 fathoms (*G. O. Sars*).

Family **Haleciidæ**.

Halecium muricatum, Ellis and Solander.

A few fragments with reproductive capsules.

This species has been found off the coast of Labrador.

Halecium crenulatum, n. sp. Pl. VIII. figs. 21-23.

Stem compound, branched; branches straight, regularly crenulated above each joint. *Hydrothecæ* supported on very short lateral processes, single or in pairs, alternate, elongate, expanding gradually towards the margin, which is slightly everted, twisted at the base, bearing a strongly annulated branchlet given off from the side. *Gonothecæ* ovate, shortly stalked, springing singly or in pairs from the lateral process beneath the calycle.

* The above diagnosis is of necessity defective; for though many fragments of the species occur amongst the Icelandic dredgings, I have not met with a specimen in a perfect condition, nor even with a piece of any considerable size. From an examination of the fragments, I am able to say that in its mature state it possesses a compound stem; but of the *habit* I can give no account; the portions from which my description is chiefly taken are either detached branches or imperfectly developed shoots. The minute characters, however, are suffi-

ciently marked, and I have no doubt that the species is distinct from any hitherto described. It makes the nearest approach to *H. labrosum*, Alder; but its calyces are very different from those of the latter species. They are not annulated towards the base, nor have they the much everted rim so characteristic of *H. labrosum*. The lower portion, supporting the cup in which the base of the polypite is lodged*, is perfectly plain, or exhibits only a slight twist near the point of origin. The whole hydrotheca is trumpet-shaped, expanding gradually upwards towards the margin, which is but slightly everted. From the lower part, a little beneath the cup, a short, strongly annulated branchlet is given off. Frequently the primary calyx supports a second, as is commonly the case in this genus, which rises from within it.

The stem is very regularly and distinctly crenulated above each joint; and this is a marked character, giving a very elegant appearance to the species. On the portions which I have had the opportunity of examining there were sometimes short branchlets alternating with the calyces, and exhibiting the same structure as the larger stems. The lateral processes supporting the calyces are very short. The gonothecæ are ovate, membranous, borne on a short stalk which is not ringed, and are developed on the lateral process. The stems are of a dark horn-colour.

Family Sertulariidae.

Sertularia tenera, G. O. Sars.

One or two specimens occur of this interesting form, which has recently been obtained at great depths (150 fathoms) off the coast of Norway by G. O. Sars.

Sertularella tricuspidata, Alder.

Very abundant and fine.

Sertularella polyzonias, Linn. Pl. VII. figs. 11, 12.

Abundant.

The robust habit and gigantic calyces give a very marked character to the northern variety of this common species. So distinctive is its appearance that, while there are no differences entitling it to specific rank, it is worthy of being recorded as *S. polyzonias*, var. *gigantea*. Sars mentions a robust variety

* The polypites of *Halecium* are only partially retractile; and little more than the base of the body is contained in the cup-like chamber which forms the upper portion of the hydrotheca. The lower portion is tubular, and in the present case almost plain throughout, whereas in *H. labrosum* it is strongly annulated near the base.

of this species which he had obtained from Greenland and Massachusetts; it may very probably be identical with the Icelandic form. Packard also tells us that in the Straits of Belle Isle (Labrador), *S. polyzonius* is found "very stout and large" in the deeper water.

Sertularella geniculata, n. sp. Pl. VII. figs. 13, 14.

Stems slender, decidedly geniculate, simple or slightly branched, jointed and twisted above each calycle; the internodes long, attenuated below, and bent in opposite directions. *Hydrothecæ* very distant, ribbed transversely, chiefly on the upper half, rather broad below, and narrowing gradually towards the aperture, which bears four very prominent teeth, is sinuated deeply between them, and is surmounted by a conical quadripartite operculum. *Gonothecæ* unknown.

Height (of the largest specimen met with) about $\frac{1}{3}$ inch.

This is a critical species. In general character it closely resembles *S. tenella*, Alder; but, after careful examination, I feel little doubt that it is a distinct form. The stem is zig-zagged; the internodes, which bend in opposite directions, are so much attenuated below as to have the appearance of distinct pieces jointed together rather than of the segments of a continuous stem. They are longer than those of *S. tenella*, and rather less decidedly twisted or annulated at the base. The calyces are about half as large again as those of the allied species; they want the regular barrel-shape of the latter, are not rounded off below, but broad and squarish, and do not taper off so decidedly towards the upper extremity. They want altogether the constriction immediately below the aperture, which, to a greater or less extent, is found in *S. tenella*. The teeth are very large, prominent, and acuminate, and the margin is deeply sinuated between them; while in the last-named species they are comparatively inconspicuous, and the rim is very slightly depressed between them. The aperture is "conspicuously squared" in *S. tenella*, and the operculum rises but little above it; in *S. geniculata* the operculum is prominently conical. The transverse ribs are much less pronounced, not giving the sharply crenulated appearance to the sides which they do in *S. tenella*; and they extend generally over a smaller proportion of the calycle. The contour and "set" of the hydrothecæ are very different in the two forms, though it is very difficult to give an exact idea of the difference in a description. The sides are rounded or curved outwards in *S. tenella*, almost straight in *S. geniculata*.

To sum up, the former species has neat, rounded, barrel-

shaped, strongly ribbed calyces, narrowed very decidedly towards the somewhat overhanging rim, which bears four short teeth, and is very little depressed between them; the latter has large, straight-walled, somewhat broad-based calyces, not sharply carinated transversely, narrowing very gradually towards the margin, which bears four very prominent and pointed teeth, and is deeply sinuated between them.

The ramification of *G. geniculata* is peculiar. Branches are given off rarely at right angles to the stem, springing from the base of a calyx; sometimes two branches are developed at opposite points on the same internode. Not unfrequently the internodes comprising a shoot do not all lie in the same plane; on the lower portion the calyces face one way and a different way above.

Notwithstanding the similarity in some points to *S. tenella*, I believe the present to be a well-established form, which may properly be ranked as a species.

Amongst the Icelandic dredgings *S. geniculata* is not uncommon.

Sertularella tenella, Alder.

I have also met with a characteristic specimen of this species.

EXPLANATION OF THE PLATES.

PLATE VI.

- Fig. 1.* *Lafoëa grandis*, Hincks, magnified.
Fig. 2. The same, more highly magnified.
Fig. 3. *Lafoëa dumosa*, Fleming, drawn to the same scale as the preceding, to show the comparative size.
Fig. 4. *Calycella obliqua*, Hincks, highly magnified.
Fig. 5. The upper portion of a calyx, to show the structure of the orifice.
Figs. 6, 7. *Lafoëa fruticosa*, M. Sars, var. *gracillima*, highly magnified. Drawn from Oban specimens.
Figs. 8, 9, 10. *Lafoëa fruticosa*, M. Sars, highly magnified. Drawn from Norwegian specimens communicated by Prof. Sars.

PLATE VII.

- Fig. 11.* *Sertularella polyzonias*, Linnæus, var. *gigantea*, magnified.
Fig. 12. The same, of the ordinary size. Drawn to the same scale for comparison.
Figs. 13, 14. *Sertularella geniculata*, Hincks, magnified.
Fig. 15. *Calycella pygmaea*, Alder, highly magnified.
Fig. 16. *Lafoëa fruticosa*, M. Sars, a slender variety from Shetland, highly magnified.

PLATE VIII.

- Figs. 17-20.* *Calycella quadridentata*, Hincks, magnified in different degrees.
Figs. 21-23. *Halecium crenulatum*, Hincks, magnified
Fig. 24. *Calycella syringa*, Linn., highly magnified.